

CLAIMS

What is claimed is:

1 1. A method of generating an external correlation key value for use in correlating alarms
2 emitted by network elements or system elements in a telecommunications network, the
3 method comprising the steps of:

4 receiving an alarm message generated by a network element or system element of the
5 telecommunications network;

6 identifying a context value in the alarm message;

7 retrieving, from a table that associates context values to internal correlation key value
8 formulas, a formula specifying how to generate an internal correlation key
9 value;

10 creating and storing the internal correlation key value based on the formula;

11 creating a unique external correlation key based on the internal correlation key value;
12 and

13 sending the alarm message and external correlation key value to an external system
14 for use in correlating alarms.

1 2. A method as recited in Claim 1, wherein the alarm message is an SNMP message, the
2 context value is an SNMP context string, and the external key is an ordinal number.

1 3. A method as recited in Claim 1, wherein the external system is an OSS system of a
2 telecommunications service provider.

1 4. A method as recited in Claim 1, wherein the table is stored at a gateway that is
2 logically located in the telecommunication network between the network element or system
3 element and an OSS system of a telecommunications service provider.

1 5. A method as recited in Claim 1, wherein each formula in the table specifies, for an
2 associated context value, one or more ordinal positions of fields in the alarm message.

- 1 6. A method as recited in Claim 1, further comprising the steps of storing the internal
2 correlation key value into an internal work area, and generating the external correlation key
3 value that uniquely represents the internal correlation key value.
- 1 7. A method as recited in Claim 1, wherein each formula in the table specifies, for an
2 associated context value, one or more fields in the alarm message, a concatenation of which
3 yields the correlation key value.
- 1 8. A method as recited in Claim 1, wherein each formula in the table specifies one or
2 more pattern matching procedures to extract one or more fields from the alarm message, a
3 concatenation of which yields the correlation key value.
- 1 9. A method as recited in Claim 1, wherein each formula in the table specifies, for an
2 associated context value, one or more ordinal positions of fields in the alarm message and one
3 or more references to objects in an external database system.
- 1 10. A method as recited in Claim 1, wherein each formula in the table specifies, for an
2 associated context value, one or more ordinal positions of fields in the alarm message and one
3 or more references to programmatic procedures that are stored in an external database system.
- 1 11. A method as recited in Claim 1, wherein each formula in the table specifies, for an
2 associated context value, one or more ordinal positions of fields in the alarm message and one
3 or more references to programmatic procedures that are stored in an external database system,
4 and wherein a concatenation of the fields and a result value from execution of the
5 programmatic procedures yields the correlation key value.
- 1 12. A method as recited in Claim 1, further comprising the steps of compressing the
2 external correlation key value such that the external correlation key value is stored in fewer
3 bits than the internal correlation key value.

1 13. A method as recited in Claim 1, wherein the table is stored at a gateway that is
2 logically located in the telecommunication network between the network element or system
3 element, and an OSS system of a telecommunications service provider; wherein each formula
4 in the table specifies, for an associated context value, one or more ordinal positions of fields
5 in the alarm message and one or more references to objects in an external database system
6 that is accessible to the gateway; and wherein a concatenation of the fields and objects yields
7 the correlation key value; and further comprising the steps of compressing the external
8 correlation key value such that the external correlation key value is stored in fewer bits than
9 the internal correlation key value.

1 14. A method as recited in Claim 1, further comprising the steps of:
2 storing the internal correlation key value and external correlation key value in a
3 persistent work area;
4 retrieving the external correlation key value from the persistent work area.

1 15. A method as recited in Claim 1, wherein sending the alarm message and correlation
2 key value comprises sending an SNMP message to an OSS system that includes a complete
3 SNMP object carrying the alarm message and the external correlation key value in an SNMP
4 field.

1 16. A method as recited in Claim 1, wherein sending the alarm message and correlation
2 key value comprises sending an XML file to an OSS system that includes the alarm message
3 and the correlation key value identified by unique XML tags.

1 17. A computer-readable medium carrying one or more sequences of instructions for
2 generating an internal correlation key value and external correlation key value for use in
3 correlating alarms emitted by network elements or system elements in a telecommunications
4 network, which instructions, when executed by one or more processors, cause the one or
5 more processors to carry out the steps of:

6 receiving an alarm message generated by a network element or system element of the
7 telecommunications network;
8 identifying a context value in the alarm message;
9 retrieving, from a table that associates context values to correlation key value
10 formulas, a formula specifying how to generate the correlation key value;
11 creating and storing the internal correlation key value based on the formula;
12 generating the external correlation key value based on the internal correlation key
13 value; and
14 sending the alarm message and external correlation key value to an external system
15 for use in correlating alarms.

1 18. A computer-readable medium as recited in Claim 17, wherein each formula in the
2 table specifies, for an associated context value, one or more fields in the alarm message, a
3 concatenation of which yields the internal correlation key value.

1 19. A computer-readable medium as recited in Claim 17, wherein each formula in the
2 table specifies, for an associated context value, one or more ordinal positions of fields in the
3 alarm message and one or more references to programmatic procedures that are stored in an
4 external database system.

1 20. A computer-readable medium as recited in Claim 17, wherein each formula in the
2 table specifies, for an associated context value, one or more ordinal positions of fields in the
3 alarm message and one or more references to programmatic procedures that are stored in an
4 external database system, and wherein a concatenation of the fields and a result value from
5 execution of the programmatic procedures yields the internal correlation key value.

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- 1 21. A computer-readable medium as recited in Claim 17, wherein the table is stored at a
2 gateway that is logically located in the telecommunication network between the network
3 element or system element and an OSS system of a telecommunications service provider;
4 wherein each formula in the table specifies, for an associated context value, one or more
5 ordinal positions of fields in the alarm message and one or more references to objects in an
6 external database system that is accessible to the gateway; and wherein a concatenation of the
7 fields and objects yields the correlation key value.

- 1 22. An apparatus for generating a correlation key value for use in correlating alarms
2 emitted by network elements or system elements in a telecommunications network,
3 comprising:
 - 4 means for receiving an alarm message generated by a network element or system
5 element of the telecommunications network;
 - 6 means for identifying a context value in the alarm message;
 - 7 means for retrieving, from a table that associates context values to correlation key
8 value formulas, a formula specifying how to generate the correlation key
9 value;
 - 10 means for creating and storing the correlation key value based on the formula; and
11 means for sending the alarm message and correlation key value to an external system
12 for use in correlating alarms.

- 1 23. An apparatus for generating a correlation key value for use in correlating alarms
2 emitted by network elements or system elements in a telecommunications network,
3 comprising:
 - 4 a network interface that is coupled to the data network for receiving one or more
5 packet flows therefrom;
 - 6 a processor;
 - 7 one or more stored sequences of instructions which, when executed by the processor,
8 cause the processor to carry out the steps of:

9 receiving an alarm message generated by a network element or system
10 element of the telecommunications network;
11 identifying a context value in the alarm message;
12 retrieving, from a table that associates context values to correlation key value
13 formulas, a formula specifying how to generate the correlation key
14 value;
15 creating and storing the correlation key value based on the formula; and
16 sending the alarm message and correlation key value to an external system for
17 use in correlating alarms.

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